Space Weather Impacts in Alaska

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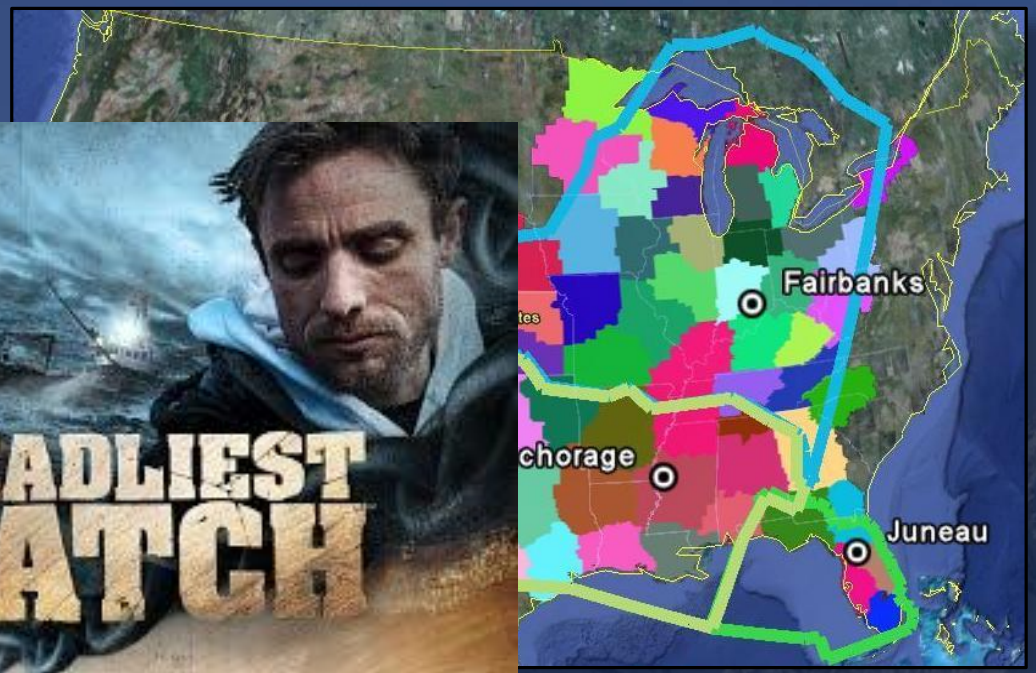
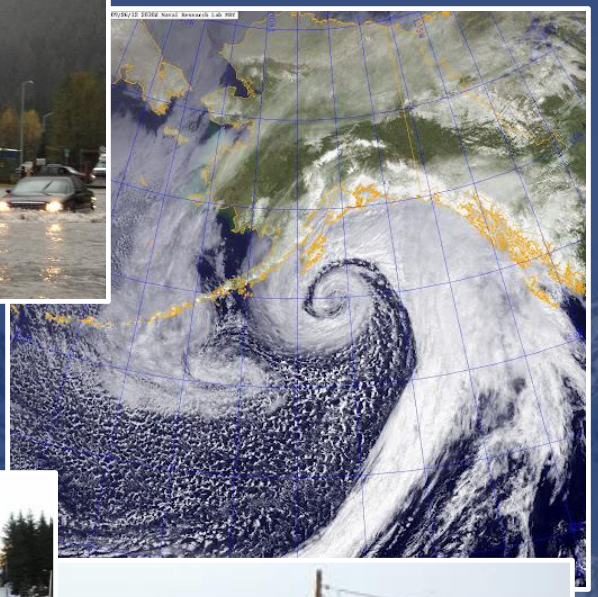
Alaska – Background (and Challenges)

- Is huge
- Is unique
- Where climate r
  weather
- Traditional Lifest
- TEK
- Alaska starts…
- Deadliest Catch!



NWS Alaska Region – Mission and Vision

- Mission: Provide weather, water and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy
- Vision: Alaska's residents and visitors will be prepared to respond to potentially hazardous environmental conditions based upon timely and relevant information from the dedicated people of the NWS.
- 242 positions in the Alaska Region



Drivers for NOAA and NWS in Alaska

National Strategy for the Arctic

- Advance U.S. security interests
- Pursue responsible Arctic region stewardship
- Strengthen international cooperation

NOAA's Strategic Plan

- Weather Ready Nation
- Resilient Coastal Communities and Economies
- Climate Adaptation and Mitigation
- Healthy Oceans

NOAA's Arctic Vision & Strategy

- Forecast sea ice
- Improve weather and water forecasts and warnings
- Strengthen foundational science to understand and detect Arctic climate and ecosystems changes
- Improve stewardship and management of ocean and coastal resources in the Arctic
- Advance resilient and healthy Arctic communities and economies
- Enhance international and national partnerships

NWS Alaska Region - Service Areas

- Aviation
- Climate
- Fire Weather
- Marine Weather and Sea Ice
- Public Forecasts and Warnings
- Rivers/Hydrology
- Space Weather
- Tsunami
- Volcanic Ash

Alaska Region Roadmap: Strategies

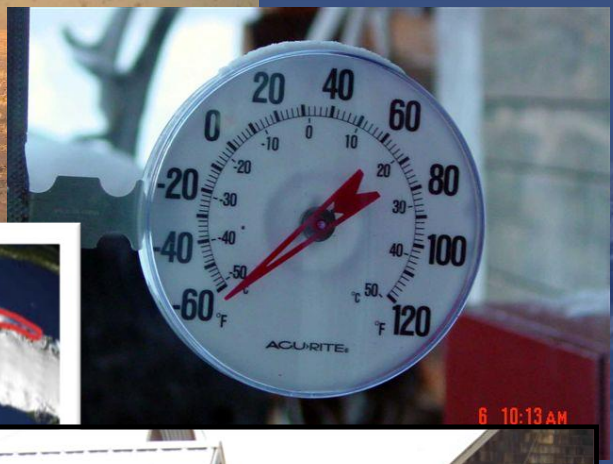
- **Transform Services** through organizational changes that improve collaboration, research to operations, and better leverage technology to deliver consistent and accurate impact based decision support services
- **Build capacity and capabilities** to expand operations, transition research, and deliver new services in Alaska
- **Enable the Workforce** to more effectively communicate environmental information and build sustainable relationships with core partners

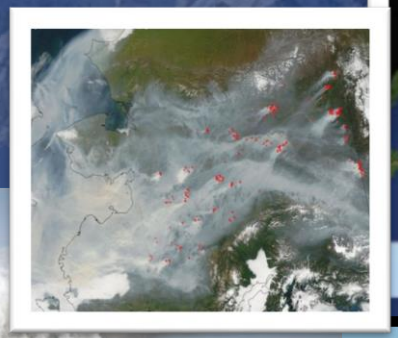
Challenges: Alaska Weather

- High Wind (14 hurricane force storms/year)
- Ice Storms
- Volcanic Ash
- High Wind and Open Water (storm surge, coastal erosion)
- Extreme Cold and High Pressure
- Blizzards
- Heavy Snow
- Tsunami
- Flooding
  - Ice Jam/Breakup
  - Coastal Storm Surge
  - Coastal Erosion
- Wild Fire
- Sea Ice
  - Resupply
  - Access
- **Space Weather**
- Gloom of Night

Challenges: Alaska

- Most of the weather phenomena are not, of course, unique to Alaska
- However, impacts of the phenomena are intensified by large data gaps, the length of Storm season, darkness and complex topography





Challenges: Alaska

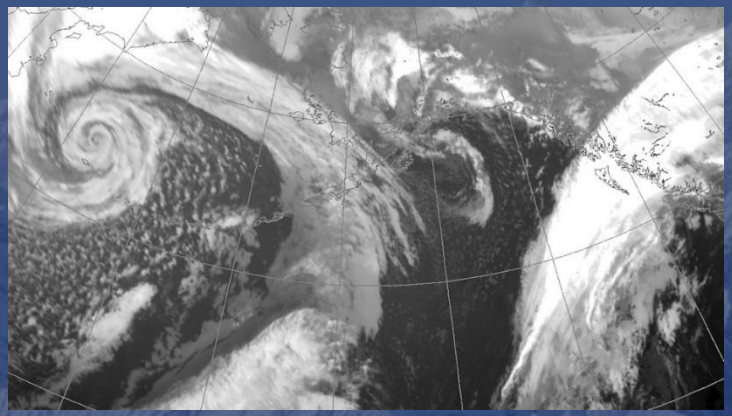
- Latitudinally and longitudinally challenged
- Supply Chain Management - a thin thread to West Coast ports
- Limited infrastructure (e.g., roads, rail)
- Limited redundancy (e.g., Port of Anchorage, power grid, Ham radio)
- Limited in situ SaR, or HAZMAT mitigation capability
- Traditional Lifestyle (and Knowledge)
- Expanding mineral extraction
- Expanding marine transportation

Challenges: Direct Space Weather Impacts

- Climate - Solar Irradiance (changes in cloud cover, convection)
- Power Grid
- GPS (Global Positioning System)
- HF (including Ham) Radio Communications
- Satellite Communications
- Satellite Drag
  - Perturbation of satellite orbits leading to difficulties in tracking
- Aviation Safety (exposure, HF communication)
- Space Weather Tourism (Aurora)

Challenges: Cumulative Impacts of Space Weather

Consider this…
Potential "recipe" for disaster



Bering Sea Storm

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Selendang Ayu in distress vicinity Dutch Harbor

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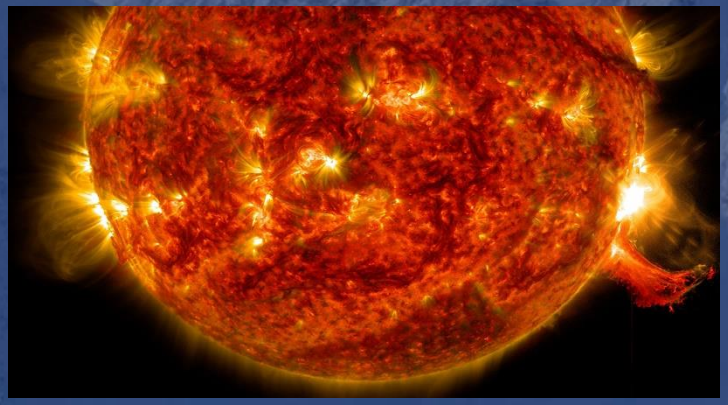

Active Sun

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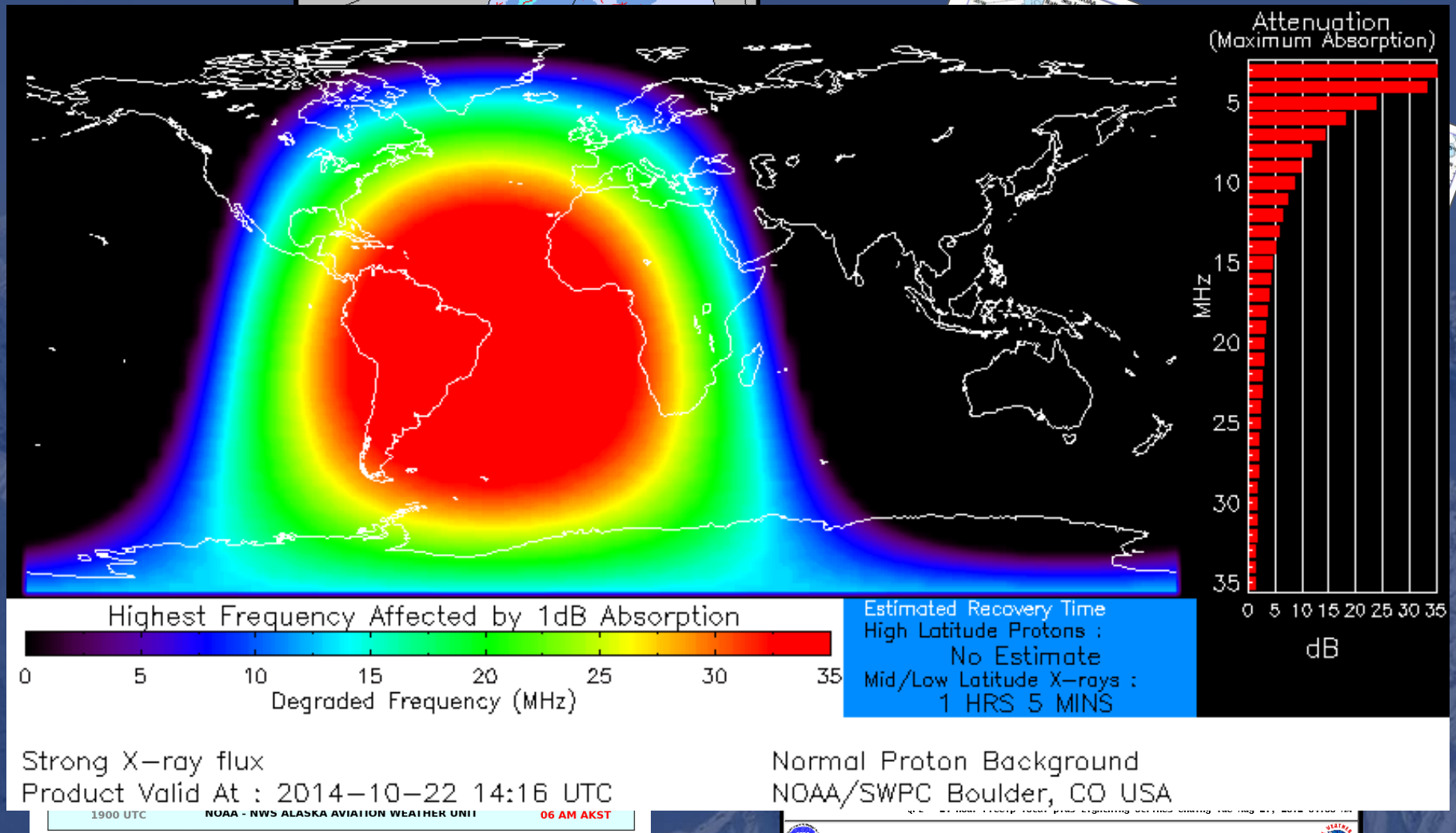
- Greatly reduced visibility due to weather
- Difficulty getting a "GPS lock" on (not where you think you are)
- Difficulty or complete outage of HF communications (no ability to communicate)
- **Greatly hampers USCG ability for SaR, spill response, etc.**

The Weather Ready Nation – Alaska



The Weather Ready Nation – Weather Enterprise

- Building on what Tom Guyer presented on Tuesday (the “money slide”)
- Building on what Bill Lapenta presented on Wednesday (Weather Ready Nation), Jill McCarthy (USGS-Industry partnership), and Seth Jonas (communicating scientific, probabilistic information of high impact events)
- Service delivery: No longer throwing products over the transom. Impact Decision Support Services (IDSS)
- Identify core partners and stakeholders. Understand their requirements and risk . Deliver those services in a timely fashion (in-person, webinar) in a geospatially-enabled fashion. Characterizing uncertainty contextually.
- Across all service programs (Sea to Sun)
- For the NWS, the service delivery point for most products and services are the field offices.
- Goal: A Weather Enterprise where we deliver fully integrated, actionable services to meet the NWS mission in Alaska, including

NOAA/NWS Arctic Test Bed

Objective: Develop useful products and delivery mechanisms to communicate current and forecast weather, climate and sea ice information with associated marine and coastal impacts including surge, inundation, and Arctic storms to enhance decision making among Arctic customers and stakeholders…such as the DHS-USCG Arctic Domain Awareness Center (ADAC). And the Space Weather Test Bed.

Staffing

- Supervisory Physical Scientist
- Science Infusion & Technology Transfer Meteorologist
- 2 Technique Development Meteorologists
- Service Delivery Meteorologist

Benefits

- Address national (multi-agency) and NOAA goals in the Arctic
- Partner with and leverage ongoing NESDIS Satellite Proving Ground activities as well as other NOAA Test Beds and Proving Grounds
- Formalize collaboration and coordination with other federal agencies with similar goals (e.g., BOEM, USACE, USGS, DOE, USCG , FAA) as well as other NOAA line offices including the National Center for Environmental Prediction (NCEP)
- Provide direct and meaningful partnership with stakeholders such as the Alaska native communities and tribal councils
- Provide input to science-based decision-making and adaptive planning guided by ongoing research and monitoring

Evaluate Requirements for Providing Decision Support in the Arctic

What are the questions we are trying to answer?
What questions are most important to support Arctic Activities?

- Engage as Many User Groups as Possible
  - Government (Policy / Safety)
  - Transportation (Marine / Aviation)
  - Communities (Subsistence / Livelihood)
- Develop a Baseline of Requirements / Impact Thresholds:
  - What current information provides what is needed?
  - What are the gaps?
  - What are the questions new observation and models should be answering?


Freezing Spray, accumulated beyond the ice edge

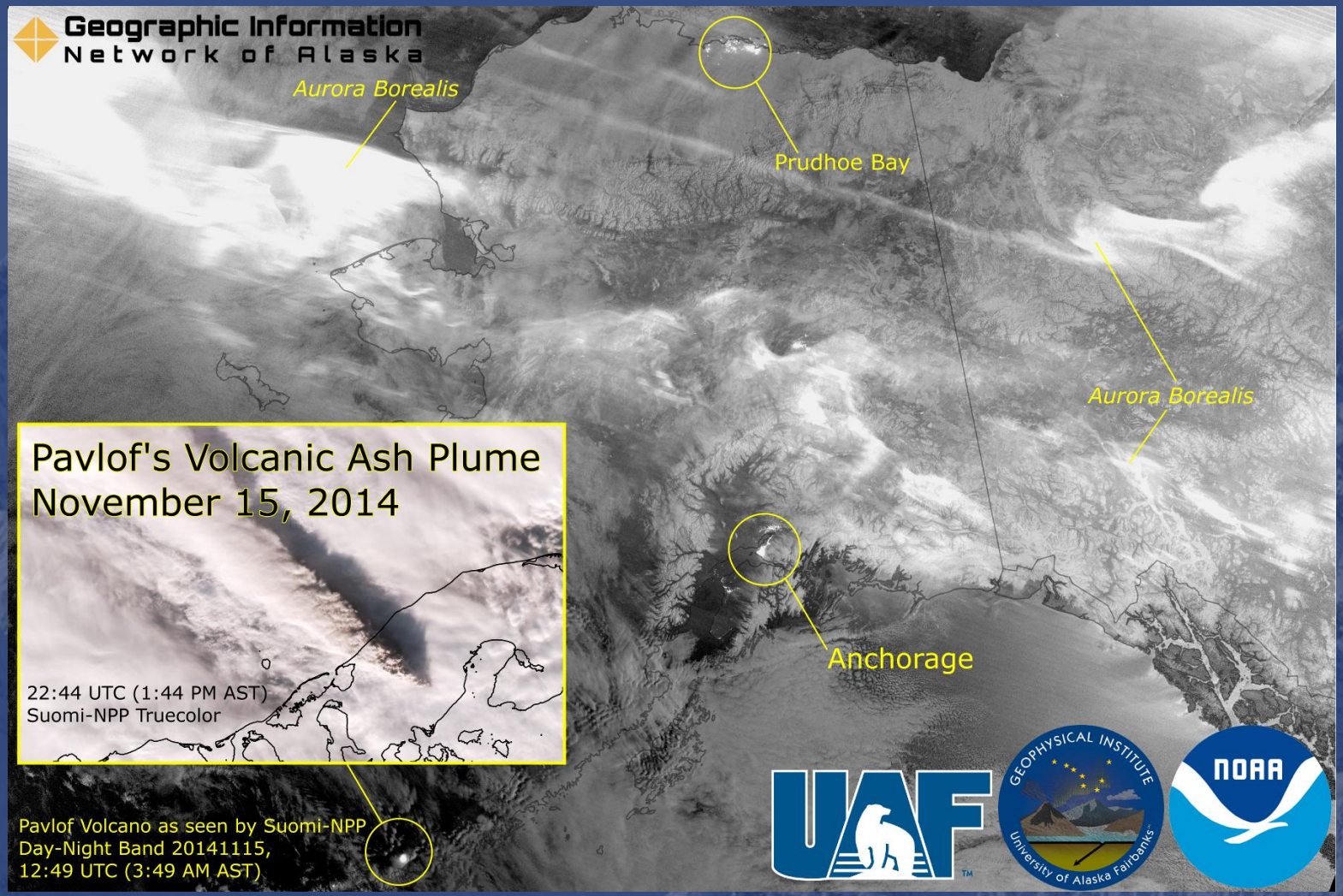

Fishing for Ophelia Crab in the Bering Sea

The Vision Realized

For Alaska to be ready, responsive, and resilient to extreme weather, water, and climate events in the face of increasing vulnerability.

Where decisions and actions are based on sound science and support healthy, productive, and resilient communities and ecosystems.

S-NPP Day-Night Band and the Aurora



Thanks for your interest!

Questions?